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The Effects of Risk Management on Management Forecast Behavior

Abstract:

Prior research examines several reasons why managers voluntarily disclose information, but provides relatively little evidence as to whether day-to-day operational decisions influence a manager's disclosure choice. In this study, we examine whether a particular operational activity – risk management through the use of derivatives – affects whether a manager decides to issue earnings forecasts. Using a large hand-collected sample of derivatives users and non-users, we find that derivatives users are more likely to issue earnings forecasts relative to non-users. We then find that this result is stronger when the use of derivatives makes it less costly for managers to issue forecasts and to meet or beat those forecasted earnings. Interestingly, however, we find no evidence that managers provide these forecasts when investors are more likely to demand them. Overall, our results suggest that operational decisions can influence management forecast policy, but *only* when these decisions make it easier for the managers to predict future earnings. This study thus provides evidence that voluntary disclosure has a role, but with limitation, in helping investors understand the complexity of derivatives.

Keywords: voluntary disclosure; management forecasts; derivatives; hedge accounting

1. Introduction

While there are a large number of studies in the accounting literature that examine why managers decide to voluntarily disclose information (Beyer, Cohen, Lys, and Walther 2010), there is relatively little evidence as to whether day-to-day operational decisions influence disclosure choice. We fill this void in the literature by examining whether a particular operational activity – risk management through the use of derivatives – affects whether a manager decides to issue an earnings forecast. Specifically, we examine three research questions. First, how does the use of derivatives influence the likelihood that managers provide an earnings forecast? [1] Second, is the association between the use of derivatives and management forecasting activity stronger when managers use derivatives in a way that makes earnings easier to forecast? Finally, is the association between the use of derivatives and management forecast activity stronger when investors are more likely to demand the forecasts?

The extent to which risk management activities affect firms' disclosure decisions is of interest not only to academic researchers, but also to investors, regulators, and practitioners. Specifically, derivatives are a significant component of the economy, as derivatives account for approximately $710 trillion in economic activity and are used by nearly two-thirds of U.S. non-financial firms (BIS 2013). Furthermore, the Financial Accounting Standards Board (FASB) and the big four accounting firms have recently expressed concerns that current disclosure requirements fail to fully inform investors about the financial statement implications of derivatives activities (FASB 2008; Ernst & Young 2010; FASB 2016).[2] Consistent with these concerns, empirical evidence suggests that, on average, neither investors nor sophisticated investors understand the implications of derivatives for future earnings

[1] Although the frequency of management earnings forecasts is the variable of interest in this study, we also investigate the likelihood that managers provide earnings forecasts using a binary variable. Our inferences are unchanged.

[2] In fact, the FASB issued a series of ten derivatives-related accounting standards in the last thirty years in an effort to standardize the accounting for derivatives and to increase mandatory derivatives disclosures.

(Campbell 2015; Campbell, Downes, and Schwartz 2015; Chang, Donohoe, and Sougiannis 2016). That is, on average, managers are not providing sufficient disclosures to help investors understand the implications of derivatives use for firm value. Thus, understanding how firms' derivatives use affects managers' disclosure choices should be of interest to regulators, practitioners, and investors.

Ex ante, it is not clear how the use of derivatives impacts the decision to issue management earnings forecasts (MEFs). On one hand, derivatives use could decrease the extent to which managers provide management forecasts. Specifically, managers often outsource their hedging policy to consultants and may not themselves be comfortable with the complexity associated with derivatives strategies (Kawaller 2004). Furthermore, forward-looking disclosures on hedging gains and losses might reveal proprietary information, particularly when firms are hedging forecasted transactions and using cash flow hedge accounting (DeMarzo and Duffie 1991; Sapra 2002; Hoang and Ruckes 2014). Therefore, providing forecasts when firms engage in hedging activity might invite further scrutiny about the hedging activities or other forward-looking information that could be used against the manager or the firm by its competitors, customers, or suppliers. To the extent that managers perceive that derivatives use increases their reputation or career concerns or their firm's proprietary costs, they may be less willing to provide management forecasts.

On the other hand, derivatives use could increase the extent to which managers provide earnings forecasts through two mechanisms. First, if firms use derivatives in a way that reduces the exposure of their profits to market-wide risks, derivatives will reduce uncertainty about future earnings and cash flows (e.g., Minton and Schrand 1999; Zhang 2009). This reduction in uncertainty should make it easier to predict future earnings levels and thus easier to not only issue forecasts but also to meet or beat those forecasted earnings. That is, managers are more likely to supply forecasts when it is less costly for them to do so. We label this reduction in the

cost of providing management forecasts as the "supply" channel. Given that managers make disclosure decisions before they observe whether derivatives use in fact results in lower future earnings volatility, it is unclear, *ex-ante*, how managers will respond to the use of derivatives.[3]

A second mechanism through which the use of derivatives could increase management forecast activity is because derivatives are financial contracts that add complexity to understanding how macroeconomic trends affect a firm's earnings. Prior studies show that even sophisticated market participants (e.g., analysts) struggle to understand the earnings implications of derivatives (Campbell et al. 2015; Chang et al. 2016). This complexity may lead capital market participants such as analysts and institutional investors to demand increased disclosure about a firm's earnings (i.e., MEFs) (Balakrishnan, Billings, Kelly, and Lungqvist 2014). We label this increased demand for management forecasts as the "demand" channel.

Using a hand-collected sample of 21,880 derivatives users/non-users, we regress the likelihood that managers issue an earnings forecast on whether a firm uses derivatives in its operations after controlling for several other known determinants of management forecast activity. Consistent with the use of derivatives making it easier to predict earnings and thus to meet or beat forecasted earnings, we find a positive association between the use of derivatives and the frequency of management forecasts. These results are robust to using a difference-in-differences research design, showing that firms issue more earnings forecasts after they initiate the use of derivatives and that firms issue fewer earnings forecasts after they terminate the use of derivatives.[4] This time-series variation in MEFs is particularly interesting because earning guidance policy is generally sticky over time absent changes in strong economic determinants of MEFs (i.e., the initiation/termination of users). Overall, these results suggest that when firms

[3] Our study thus differs from prior studies that examine earning volatility and MEF. This study focuses on future earnings uncertainty instead of past earning volatility.

[4] We use derivatives initiation (termination) as an event to examine the effect of derivatives on MEFs. To account for the endogeneity in a firm's decision to use derivatives, we use propensity score matching to identify a control group of non-derivatives users. See Section 4 for details.

use derivatives, they are more likely to provide earnings forecasts relative to firms that do not use derivatives.

In the second stage of our analysis, we perform several cross-sectional tests to disentangle the "supply" and "demand" channels. Specifically, to test the "supply" channel, we partition the sample into subsets of observations in which derivatives are most likely to reduce the volatility of earnings and thus make it easier for managers to forecast future earnings, namely, (1) when firms apply hedge accounting instead of non-hedge accounting, (2) when firms more effectively hedge against market risk, and (3) when firms use derivatives after SFAS 133, which made it easier for derivatives to reduce the volatility of earnings.[5] The results confirm that the positive association between the use of derivatives and the frequency of management forecasts is stronger across all three of these partitions. These cross-sectional results support the notion that using derivatives makes it easier to issue forecasts and to meet or beat those forecasted earnings (i.e., the "supply" channel).

To test the "demand" channel, we partition the sample into subsets of observations in which investors are most likely to demand earnings forecasts from derivatives users, namely, (1) when firms use more complex derivatives, (2) when firms have higher analyst following, and (3) when firms have higher institutional ownership. When sophisticated investors do not understand the implications of derivatives for firm performance (Campbell et al. 2015; Chang et al. 2016), they will demand guidance from the derivatives users on the expected gains/losses related to derivatives. We find no evidence that the positive association between the use of derivatives and the frequency of management forecasts is stronger across these three partitions. Thus, these cross-sectional results do not support the argument that the association between the

[5] Statements of Financial Accounting Standards No. 133 (SFAS 133), *Accounting for Derivative Instruments and Hedging Activities*, is an accounting standard issued in June 1998 by the FASB that requires companies to measure all derivatives on their balance sheet at fair value. SFAS 133 also extends hedge accounting to all instruments and allows firms to recognize gains/losses on hedged items and derivatives in the same accounting period for highly effective, qualifying hedges. This accounting standard is now codified under ASC 815.

use of derivatives and greater voluntary disclosure is due to the increased demand for management forecasts (i.e., we find no support for the investor "demand" channel). Overall, our results suggest that firms' risk management activities (i.e., derivatives use) influence managers' disclosure decisions, primarily due to the impact that the use of derivatives has on the cost and effort of producing earnings forecasts and subsequently meeting earnings targets.

In additional analyses, we provide further evidence that derivatives are linked to increased forecast activity by showing that foreign currency hedgers are more likely to issue sales forecasts than interest rate hedgers because foreign currency hedges often relate to sales activities and thus make sales forecasts easier to make, which is again consistent with the "supply" channel. We also examine the impact of derivatives use on the properties of MEFs other than the number of forecasts made, such as their timeliness, precision (i.e., a point estimate vs. a range estimate), and accuracy. We find that derivatives users are more likely to make forecasts that are point estimates and have greater forecast accuracy, again supporting the "supply" channel. Overall, our findings show that managers not only increase the frequency of their disclosure but also issue more informative disclosures.

This study contributes to the literature in several ways. First, we add to the voluntary disclosure literature as the first study to connect risk management policy to disclosure policy. More importantly, we provide evidence on the mechanism that leads to more voluntary disclosures for derivatives users. Our study extends our understanding of why managers provide more (or less) disclosure. Specifically, the relation between derivatives and disclosure varies with the choice of hedge accounting, the effectiveness of hedging activities, and the types of exposure hedged. We, thus, answer calls for research on the motivations behind managers' decisions to provide voluntary disclosure (Core 2001; Healy and Palepu 2001; Beyer et al. 2010; Leuz and Wysocki 2016).

Second, we contribute to the literature examining the interplay between mandatory and voluntary disclosure by documenting the extent to which a firm's use of derivatives interacts with its disclosure policy, providing implications for regulators. Numerous parties (including the FASB and the Securities and Exchange Commission) have expressed concerns over the complexity of SFAS 133 and the ability of investors to understand the financial statement implications of derivatives use (SEC 2008; Ernst & Young 2010; FASB 2016) and regulators have attempted to improve the mandatory disclosure requirements. Our finding that managers provide forecasts that are easier to produce (and meet), but do not provide forecasts when investors have a greater need for them, suggests that managers' cost of supplying forecasts, and not investor demand, dominates the decision to issue forecasts. In fact, we document that managers are less likely to provide voluntary disclosure when investors would need it the most (i.e., when managers are speculating and increasing the overall firm risk as speculator/ineffective hedgers or non-hedge accounting users).[6] These findings suggest that managers' self-interest (reputational and career concerns) dominates investor demand.[7] Thus, if regulators wish to protect those investors that need enhanced derivatives-related earnings disclosures the most, our results suggest that they will need to mandate such disclosure.[8]

Lastly, an implicit assumption in management earnings forecast studies is that managers can obtain the information for a forecast in a relatively cost efficient way (as they are likely already forecasting earnings internally). Managers are assumed to then decide whether to disclose or hide that information. While it is difficult to observe the cost of supplying MEFs, this study provides novel empirical evidence that managers' reputational and

[6] A number of risk management surveys document that the number of speculator/ineffective hedgers is non-trivial and deserves the policy-makers attention (Bodnar, Hayt, and Marston 1996; Bodnar, Hayt, and Marston 1998; Bodnar, Giambona, Graham, Harvey, and Marston 2011).

[7] This cross-sectional test helps alleviate the concerns that no results from the demand channel may be due to lack of statistical power or noisy proxy.

[8] An example of potential mandatory disclosure items is hedged/unhedged portions of risk exposure (hedge ratio). Mandating disclosures on the hedge ratio would help investors gauge the effects of hedges on earnings because the net gain/loss from hedged and unhedged items ultimately impacts the bottom line earnings (Kawaller 2004).

career concerns are an important source of agency cost for issuing MEFs and that risk-averse managers may be reluctant to undertake value-enhancing activities such as voluntary disclosure. This finding has implications for the literature because the lack of management disclosure documented in prior studies may not be due to managerial decisions to withhold information from investors but rather a byproduct of the manager's utility function (i.e., risk aversion) that could possibly be mitigated through the use of options and severance pay compensation schemes.

2. Related Literature

Determinants and Consequences of Derivatives Use

Determinants of Derivatives Use

The main reason firms enter into derivatives contracts is to reduce the cash flow volatility associated with certain market-wide risks that are beyond the control of managers. Not surprisingly, prior research finds that firms are more likely to hedge when cash flow volatility is a greater concern for them, i.e., when firms have higher growth opportunities and are closer to bankruptcy (Smith and Stulz 1985; Froot, Scharfstein, and Stein 1993; Géczy, Minton, and Schrand 1997). In addition, there are a number of manager-specific reasons why hedging can be useful. For instance, a manager with a stock option portfolio with high delta and/or low vega is likely to prefer less volatile stock prices, and thus will be more likely to engage in hedging activities (Smith and Stulz 1985). Finally, larger firms are more likely to use derivatives because the costs of a derivatives program can be prohibitive for small firms (Géczy et al. 1997; Bodnar, Hayt, Marston, and Smithson 1995). Overall, firms are likely to hedge market risks if they expect that the reduced cash flow volatility will increase firm value.

Consequences of Derivatives Use

Theory predicts that the use of derivatives lowers the volatility of future cash flows and earnings, and empirical research has shown that on average, this is indeed the case (e.g., Minton and Schrand 1999; Guay 1999). This decrease in cash flow volatility has a number of benefits, including a lower cost of debt, higher levels of investment, and a lower likelihood of having investment restrictions in loan agreements (Minton and Schrand 1999; Campello, Lin, Ma, and Zou 2011).

However, prior research also documents that derivatives users incur a number of direct and indirect costs (e.g., Bodnar et al. 2011). For example, survey evidence suggests that the use of derivatives involves significant direct costs, with 45% of survey respondents indicating moderate to high levels of concern regarding costs associated with derivatives (Bodnar et al. 1995). Direct costs include bid-ask spreads and premiums on derivatives contracts, employee compensation, consulting fees, and documentation costs (Bodnar et al. 2011). A foreign exchange manager of a U.S. based manufacturer estimated these costs at $1.5 million annually (Brown 2001). Finally, research finds that complexity from derivatives leads to less accurate and more dispersed analyst earnings forecasts, which impose indirect costs on firms' information environment (Campbell et al. 2015; Chang et al. 2016).

Overall, the literature documents a number of costs and benefits associated with the use of financial derivatives in a firm's broader risk management strategy. We contribute to this stream of literature by adding an additional benefit associated with the use of derivatives (at least in certain contexts); namely, an increase in the quality of MEFs. Furthermore, this increase in management forecast quality seems to be driven by a lower cost of supplying earnings forecasts for derivatives users relative to those firms that do not use derivatives.

Determinants and Consequences of Management Earnings Forecasts

The Costs and Benefits of Management Earnings Forecasts

A long line of accounting research examines why firms voluntarily disclose information. Managers face a trade-off between the costs and benefits of disclosure when making their disclosure policies. Disclosures impose at least some direct costs for the manager and the firm as managers must expend time and effort in gathering the requisite information for an earnings forecast. Voluntary disclosures can also increase reputation, career, litigation, and proprietary costs. For example, Baginski, Campbell, Hinson, and Koo (2018) show that career concerns can affect disclosure choices because managers with strong career concerns have incentives to delay bad news disclosures. Furthermore, inaccurate MEFs lead to higher career, reputational, and litigation costs (Stocken 2000; Cao and Narayanamoorthy 2011). Research also shows that managers are more likely to issue earnings forecasts in less litigious reporting environments (i.e., Canada) (Baginski, Hassell, and Kimbrough 2002) and are more likely to obscure information in more competitive industries (Verrecchia and Weber 2006). However, empirical evidence for the proprietary cost hypothesis is mixed (Cao, Ma, Tucker, and Wan 2017). Overall, managers not only consider the direct costs of providing management forecasts, but also costs related to litigation, career, and reputation when earnings are difficult to forecast. Improving the accuracy of management forecasts (by reducing earnings volatility through the use of derivatives) can decrease managements' exposure to these disclosure costs.

Research also reveals several benefits related to issuing a MEF. Economic theory suggests that by reducing the information asymmetry between firms and investors, disclosures can increase the liquidity of a firm's stock (Amihud and Mendelson 1986; Easley and O'Hara 2004). Specifically, greater disclosure can reduce the adverse selection component of the bid-ask spread. In addition, studies show that disclosure policies can affect a firm's cost of capital by either reducing estimation risk or affecting the pricing of information quality (Barry and Brown 1985; Easley and O'Hara 2004). Finally, as just discussed, the effort exerted by managers in making voluntary disclosures should provide better internal information on firm

performance. This should not only help managers provide higher quality disclosures, but also improve their ability to make value-increasing investment decisions (Hemmer and Labro 2008; Dorantes, Li, Peters, and Richardson 2013; Ittner and Michels 2017).

3. Hypothesis Development

Risk management activities (i.e., the use of financial derivatives) can affect firms' disclosure decisions in several ways. On one hand, managers may face incentives to reduce the frequency of earnings forecasts when their firms use derivatives due to the added complexity associated with derivatives (Harris and Rajgopal 2017). Furthermore, prior research, as well as anecdotal evidence, suggests that forward-looking disclosures on hedging gains and losses can reveal proprietary information (DeMarzo and Duffie 1991; Sapra 2002; Hoang and Ruckes 2014). For example, in a comment letter to the FASB's exposure draft of SFAS 133, the Edison Electric Institute (EEI) stated that, "the proposed level of detail required in disclosures may be used with other footnote disclosures which inadvertently require the disclosure of competitively sensitive information." Therefore, managers may not want to issue earnings forecasts when using derivatives for fear of disclosing proprietary information directly or indirectly by inviting further questions about hedging activities. For example, in a recent survey, a CFO recently noted "I would jump on the [conference] call when the question involved taxes or foreign currency. We did not get into the weeds of what was hedged. We never told them what short-term or long-term exposures were hedged" (Harris and Rajgopal 2017).

Furthermore, financial derivatives advisory firms offer risk management services including hedge structuring, execution, documentation, and reporting, and corporate needs for these services are evidenced by their large presence. Thus, not all managers are fully informed of the details of their firm's risk management strategy and its expected impact on future

earnings. For example, one CFO mentioned, "most CEOs care about net income or earnings and understand at a broad level that they have foreign businesses[,] and [that] foreign currency can affect earnings from those businesses but that's about it." (Harris and Rajgopal 2017). Managers may be reluctant to issue earnings forecasts if they do not fully understand the impact of derivatives on earnings. For these reasons, the frequency of MEFs might decrease when a firm uses derivatives.

On the other hand, the frequency of MEFs might increase when a firm uses derivatives through at least two mechanisms. First, although forecasting earnings is time-consuming and involves considerable managerial effort (Bamber and Cheon 1998), risk management strategies such as hedging with derivatives can reduce the volatility of future cash flows and earnings. As a result, these strategies could reduce the time and effort (i.e., the cost) expended in forecasting earnings. For example, a corn producer can sell corn for whatever the market price happens to be after the harvest, or alternatively lock in a price in advance by selling a futures contract for at least a portion of their expected harvest. The futures contract will stabilize the corn producer's revenues, making it easier to forecast next-period sales. Given this reduction in uncertainty, managers may be more likely to forecast earnings because it is easier to predict earnings and thus easier to meet the predicted earnings targets. Moreover, meeting these targets enable the managers to avoid any reputation or career concerns, or litigation costs associated with missing earnings forecasts (Skinner 1994; Baginski et al. 2002; Kothari, Li and Short 2009; Baginski et al. 2018). Because managers are more likely to supply forecasts when it is less costly for them to do so, we label these direct and indirect reductions in the costs of providing management forecasts as the "supply" channel.

Second, investors may demand more disclosure from derivatives users. Prior studies show that market participants such as investors and analysts do not fully understand the implications of derivatives use for firm value (Campbell 2015; Campbell et al. 2015; Chang et

al. 2016). Thus, derivatives users might be more likely to issue earnings forecasts if this information is demanded by a firm's financial analysts and sophisticated institutional investors. Failure to provide disclosure when investors demand it can have negative consequences for a firm's reputation and stock price because analysts may decide to stop following the firm and sophisticated investors may decide to "vote with their feet" and sell their shares (Bhushan 1989; Parrino, Sias, and Starks 2003; Roulstone 2003). We label this increased demand for management forecasts as the "demand" channel. Ultimately, whether derivatives use affects the likelihood that a firm provides management earnings forecasts is an empirical question. Accordingly, we test the following non-directional hypothesis:

> ***HYPOTHESIS 1:*** *There is no relation between the use of derivatives and the frequency of MEFs.*

Tests of the "Supply" Channel Explanation

Next, we develop cross-sectional tests to better understand whether the results of H1 are affected by firms' incentives under the "supply" or "demand" channels. To do so, we first focus on the "supply" channel, and devise cross-sectional tests for this channel by discussing how accounting for derivatives helps derivatives users forecast their future earnings. Specifically, we break the use of derivatives down by (1) the decision to use hedge accounting, (2) the effectiveness with which derivatives reduce a firm's exposure to market risk, and (3) the impact of SFAS 133. We predict that these different types of derivatives use have different effects on the cost of supplying MEFs. That is, each of these cases should make future cash flows and earnings less volatile and, thus, make it easier to issue forecasts and to meet or beat those forecasted earnings.

Accounting Choice of Hedge Accounting

Firms can choose whether to designate derivatives as a hedge (under "hedge accounting" rules), or treat the derivatives as trading derivatives that do not receive hedge

accounting treatment. If the derivatives are not designated as a hedge, changes in the fair value of the derivatives must be recorded currently in net income – regardless of when changes in the fair value of the hedged item are recorded. Thus, if a firm does not qualify for hedge accounting, its earnings could be even *more volatile* than if it had not chosen to use derivatives at all. In contrast, if a firm elects hedge accounting then gains and losses on both the derivatives and hedged item are recognized in the same period, and this reduction in earnings volatility will lower the cost of forecasting future earnings.

To illustrate these concepts, consider the following example. Assume that in year *t*, a firm hedges the next-period forecasted purchase of corn. Without hedge accounting, the change in the fair value of the derivatives would be recognized in earnings in year *t* and the price of the underlying purchase would be recorded at its market price in year *t*+1 (this timing mismatch *exacerbates* earnings volatility because the hedge gain or loss moves in one direction while the underlying price moves in the opposite direction). However, with hedge accounting, gains/losses on derivatives are recognized in the earnings in year *t*+1 (offsetting the inventory purchase and thus resulting in no change in future earnings volatility).

Given the reduction in future earnings volatility, it is clearly easier to forecast earnings when hedge accounting is elected because the firm can more easily forecast the cost of goods sold in the next period (see Appendix B, Example 1 for a detailed example). Therefore, if managers provide forecasts because they are less costly to produce, we would expect to find that the relation between the use of derivatives and MEFs is stronger when managers elect hedge accounting relative to when they do not:

> ***HYPOTHESIS 2A****: The frequency of MEFs is higher for hedge accounting users relative to non-hedge accounting users.*

Sensitivity to Underlying Price Movements

A firm may elect not to use hedge accounting, but still use derivatives to reduce its exposure to the price of an underlying item (e.g., interest rate, foreign exchange rate, or commodity price). Furthermore, even if a firm elects hedge accounting, there is wide variation in the extent to which it can hedge its full exposure to these underlying items. Surveys find that firms hedge far less than 100 percent of their exposure, and that the hedge ratio is determined by factors such as firm size, risk, and the delta and vega of the manager's stock portfolio (Smith and Stulz 1985; Froot et al. 1993; Géczy et al. 1997). That is, the election of hedge accounting may not be a sufficiently powerful measure of the extent to which the use of derivatives reduces the volatility of a firm's earnings. Appendix B, Example 2 provides an example.

Therefore, an alternative way to assess the "success" of a firm's derivatives program is to examine whether its market risk exposure is lower after initiating the derivatives program. The lower the *ex-post* risk exposure, the more effective the firm has been in reducing future earnings volatility by using derivatives. If managers provide forecasts because they are less costly to produce, the relation between the use of derivatives and MEF quality should be stronger if the firms also use derivatives to reduce their sensitivity to market risks:

> ***HYPOTHESIS 2B:*** *The frequency of MEFs is higher for firms that use derivatives to reduce their sensitivity to market risks.*

The Impact of SFAS 133

Finally, SFAS 133, *Accounting for Derivatives Instruments and Hedging Activities*, was introduced to make the hedge accounting rules more accurately reflect underlying hedging relationships and to make it easier to achieve a reduction in future earnings volatility (FASB 1998). Specifically, SFAS 133 allows more instruments to qualify for hedge accounting, requires the hedges to be more effective, and allows firms to account for these hedges to minimize their earnings volatility. [9] Therefore, the use of hedge accounting in the post-SFAS

[9] Specifically, SFAS 133 requires firms to report all derivatives at fair value while allowing hedge accounting under certain conditions. First, prior to SFAS 133, the accounting for derivatives was determined by the treatment of the hedged items. Thus,

133 period is likely to result in lower earnings forecasting costs than in the pre-SFAS 133 period. If managers provide forecasts when they are less costly to produce, the relation between the use of derivatives and MEF quality should be stronger when the firms designate derivatives as hedges in the post-SFAS 133 period relative to the pre-SFAS 133 period:

> ***HYPOTHESIS 2C:*** *The frequency of MEFs is higher in the post-SFAS 133 period relative to the pre-SFAS 133 period for hedge accounting users.*

However, counter forces exist against H2A, H2B, and H2C (the "supply" channel explanation). Specifically, the use of derivatives and hedge accounting do not necessarily reduce uncertainty in future earnings as *ex-post* hedge results may not be successful. Furthermore, managers may use derivatives for non-hedging activities (i.e., speculation), which could make their future earnings more (not less) certain. In addition, forward-looking disclosures (such as earnings guidance) are protected by the "safe harbor" regulations, which reduce the litigation costs associated with providing inaccurate earnings forecasts. Finally, if earnings are easier to predict, the benefits associated with providing a management forecast should also be lower. Specifically, in these cases, there is less information asymmetry between managers and external capital market participants such as financial analysts and institutional investors. Thus, the reduction in a firm's bid-ask spread or cost of capital provided by management forecasts may not be significant enough to warrant the work required to provide such forecasts.

Tests of the "Demand" Channel Explanation

As previously discussed, prior research suggest that the capital market participants are likely to demand more information from derivatives users due to the increased economic and financial reporting complexity associated with derivatives (Campbell et al. 2015; Chang et al.

some derivatives were reported at fair value while others were reported at historical costs, leading to inconsistent accounting treatments over time. Second, because SFAS 133 standardized the hedge accounting criteria, more effective hedges qualified for hedge accounting after its adoption (Ahmed, Kilic, and Lobo 2011). For example, in the pre-SFAS 133 period, there was no authoritative guidance on whether or how "hedge accounting" should be applied for certain types of derivatives contracts, such as options (AICPA 1986). Third, hedge accounting under SFAS 133 reduces earnings volatility by allowing firms to record the gains/losses on both the derivatives and the hedged item in earnings in the same accounting period.

2016). We use three measures to identify firms that are likely to experience greater demand for managerial forecasts. First, following Chang et al. (2016), we classify firms based on whether they experience high or low economic complexity with respect to derivatives using data on the types of derivatives used. Second, we partition the sample based on analyst coverage. Given prior evidence that analysts demand information from managers (Balakrishnan et al. 2014) and that analysts do not understand the implications of derivatives (Chang et al. 2016), we expect a positive relation between analyst coverage and derivatives use if the demand channel exists. Lastly, we use institutional holdings as a substitute measure for analysts' coverage. If the demand channel explains part of the positive association documented in H1, we expect the frequency of MEFs will be higher for firms with high economic complexity, firms with higher analyst following, and firms with higher institutional ownership:

> ***HYPOTHESIS 3:*** *The frequency of MEFs is higher for users with more complex derivatives, high analyst coverage, and high institutional ownership.*

Similar to H2, there are forces that work against the "demand" hypotheses H3A, H3B, and H3C. First, if the market perceives derivatives to be complex, it is possible that they will demand disclosure directly related to derivatives rather than indirectly through MEFs. If so, the use of derivatives will have no impact on the MEFs. Second, although analysts with derivatives users show more forecast errors, the analysts may not realize exactly what they fail to understand. If so, analysts may not demand more information from derivatives users because the analysts are not aware that derivatives are the underlying driver of their forecast errors. If this is true, we may not observe demand channel effects.

4. Research Design

Research Design for H1

We first test the association between the use of derivatives and the frequency of MEFs using the following negative binomial model:

$$FREQ_{it} = \psi_0 + \psi_1 USER_{it} + \sum_x \psi_x CTRL^x_{it-1} + \sum_k \psi_k IND^k_{it-1} + \sum_t \psi_t YR^t_{it} + \varepsilon_{it}, \quad (1)$$

where $FREQ_{it}$ equals the number of annual earnings forecasts issued by firm *i* in year *t* and $USER_{it}$ equals 1 if firm *i* reports a position in derivatives in fiscal year *t* and 0 otherwise. We control for a set of variables that prior studies suggest as the factors that influence firms' disclosure choices. Consistent with prior studies (Li 2010; Ali, Klasa, and Yeung 2014; Cao et al. 2017), we include institutional ownership (*INST*), market value of equity (*SIZE*), analyst following (*FOL*), and the market-to-book (*MB*) ratio. We also include audit firm size (*BIGN*) to capture whether a firm's disclosure policy is heavily influenced by audit quality (Dunn and Mayhew 2004). Prior research (e.g., Skinner 1994; Healy and Palepu 2001) suggests that litigation risk and negative news affect disclosure choices because firms generally increase their disclosure when facing litigation risks from delayed disclosure about negative news. Thus, we include litigation risk (*LITIGATION*) and negative news (*NEGNEWS*). We also control for the volatility in earnings (*ExPOST_EVOL*) and abnormal returns (*ABRETVOL*) because they reflect the cost and effort of issuing forecasts (Waymire 1985).[10] Finally, we include abnormal accruals (*ABACC*) to account for the relation between disclosure frequency and earnings management (Jo and Kim 2007). If H1 holds, the coefficient on *USER* should be positive after controlling for all of these variables (i.e., $\psi_1 > 0$).

Endogeneity

A large concern in our study is that the firm characteristics may be correlated with both the use of derivatives and disclosure. To test our hypotheses H1A and H1B mitigating endogeneity, we use the focused setting of *New Users* (*New Non-Users*) and a difference-in-differences design. Following Guay (1999) and Chang et al. (2016), we identify a subsample

[10] Our argument is based on uncertainty regarding future earnings. The variable *ExPOST_EVOL* is based on the ex-post realization of earnings. When we exclude *ExPOST_EVOL* from our tests, the results are unchanged (and are, in fact, a bit stronger without *ExPOST_EVOL*).

of new derivatives users (new non-derivatives users). We use derivatives initiation (termination) as an event to examine the effect of derivatives on MEFs and address the concerns about correlated omitted variables. A firm is a *New User (New Non-User*) if the firm initiates (terminates) a derivatives position at some point between 1997 and 2012. We use the initiation (termination) year as the event year and perform difference-in-differences tests. The sample of *New Users* (*New Non-Users*) consists of 797 (430) firm observations (events).

To account for the endogeneity in a firm's decision to use derivatives, we use propensity score matching to identify a control group of *Non-Users*. We limit the potential control firms to those that do not use derivatives at any point during the sample period and then estimate the propensity of derivatives initiation (termination) using the probit model. In this probit model, we include risk management incentives that explain corporate use of derivatives.[11] It includes exposures to interest rate (*IRISK*), foreign exchange rate (*FRISK*), and commodity price (*CRISK*) risks because surveys have shown that these are the risks most often managed with derivatives (Bodnar, Jong, and Macrae 2003). By insulating firm value and cash flow from unfavorable changes in risk exposure, derivatives can thwart financial distress (Mayers and Smith 1982), harmonize financing and investment goals (Froot et al. 1993), and reduce agency conflicts (Smith and Stulz 1985). We include the likelihood of financial distress (*ALTZ*), likelihood of underinvestment (*USCORE*), and the sensitivity of executive compensation to firm value (*ECSENS*) to capture these incentives. We also include the cash effective tax rate (*CETR*) to reflect the tax planning features of derivatives (Donohoe 2015). As derivatives substitutes, we control for convertible debt (*CDEBT*), preferred stock (*PSTOCK*), and abnormal accruals (*ABACC*). Lastly, the volatility of cash flow (*ExPOST_CVOL*) and earnings (*ExPOST_EVOL*) reflect other basic incentives for using derivatives (Zhang 2009). By

[11] Our matching model includes risk management incentives given that the determinants of MEFs are not directly related to firms' propensity to use derivatives. In unreported tests, we include all covariates in the matching model to match firms on as many relevant characteristics as possible, and the inferences from our study do not change.

including risk management incentives, the absence of derivatives among the potential *Non-User* control firms reflects a choice not to use them, rather than no incentives to do so.

After matching *New Users* (*New Non-Users*) with *Non-Users*, we estimate the following two negative binomial models:

$$FREQ_{it} = \varphi_0 + \varphi_1 NEWUSER_i + \varphi_2 POST_{it} + \varphi_3 NEWUSER \times POST_{it} + \sum_x \varphi_x CTRL^x_{it-1} + \sum_k \varphi_k IND^k_{it-1} + \sum_t \varphi_t YR^t_{it} + \varepsilon_{it}, \quad (2)$$

$$FREQ_{it} = \phi_0 + \phi_1 NEWNONUSER_i + \phi_2 POST_{it} + \phi_3 NEWNONUSER \times POST_{it} + \sum_x \phi_x CTRL^x_{it-1} + \sum_k \phi_k IND^k_{it-1} + \sum_t \phi_t YR^t_{it} + \varepsilon_{it}, \quad (3)$$

where *NEWUSER* (*NEWNONUSER*) equals 1 for *New User* (*New Non-User*) observations and 0 for the control firm observations. *POST* is coded 1 for the post-treatment periods for *New Users* (*New Non-Users*) and the corresponding control firms (0 otherwise). The coefficient on *NEWUSER* (*NEWNONUSER*) captures the difference in the frequency of MEFs between *New Users* (*New Non-Users*) and the control firms before derivatives initiation (termination), and the coefficient on *POST* reflects the change in the frequency of MEFs among the control firms between the pre-and post-initiation (termination) periods. Thus, the coefficient on *NEWUSER*×*POST* (*NEWNONUSER*×*POST*) captures the effect of initiation (termination) on the frequency of management forecasts for *New Users* (*New Non-Users*) relative to *Non-User* control firms. If H1 holds, the coefficient on *NEWUSER*×*POST* should be positive (i.e., $\varphi_3>0$) and/or the coefficient on *NEWNONUSER*×*POST* should be negative (i.e., $\phi_3<0$).

Research Design for H2

To disentangle the supply and demand channels, we perform three sets of tests for each channel. We first test whether hedge accounting users are likely to issue more forecasts than non-hedge accounting users by replacing *USER* in Eq. (1) with *HEDGE_USER* and *NONHEDGE_USER* (H2A). *HEDGE_USER* equals 1 for *User* observations with non-missing and non-zero unrealized holding gains/losses from derivatives (0 otherwise), and

NONHEDGE_USER equals 1 for *User* observations with missing or zero unrealized holding gains/losses from derivatives (0 otherwise).[12] If H2A holds, the coefficient of *HEDGE_USER* should be economically greater and statistically more significant than that of *NONHEDGE_USER*.

To test H2B, we first classify *New Users* as effective or speculator/ineffective hedgers following Zhang (2009). We designate a *New User* as an effective derivatives user (speculator/ineffective hedgers) if the actual risk exposure is less than (equal to or greater than) expected after derivatives initiation. We then estimate Eq. (2) with two modifications. First, we replace *NEWUSER* with (1) an indicator variable equal to 1 for effective hedgers (0 otherwise), and (2) an indicator variable equal to 1 for speculator/ineffective hedgers (0 otherwise). Second, we interact these two variables with *POST*. If H2B holds, the coefficient on *EH×POST* should be economically greater and statistically more significant than that of *SPIN×POST*.

Lastly, to test H2C, we modify Eq. (1) by replacing *USER* with two dummy variables, i.e., *SFAS133* and *HEDGE_USER*. *SFAS133* is an indicator variable equal to 1 for observations after the SFAS 133 effective date (fiscal-year June 2000) (0 otherwise); *HEDGE_USER* equals 1 for *User* observations with non-missing and non-zero unrealized holding gains/losses from derivatives (0 otherwise). The interaction term between *SFAS133* and *HEDGE_USER* indicates the effects of *SFAS133* on the frequency of MEFs issued by hedge accounting users. We expect a positive coefficient on this interaction term (H2C).

Research Design for H3

[12] *NONHEDGE_USER* includes all users in the pre-SFAS 133 period and users in the post-SFAS 133 period who choose not to elect the hedge accounting option. The inclusion of users in the pre-SFAS 133 helps to control for omitted variables correlated with the decision to be hedge users. Moreover, limiting the sample to firms-years in the post-SFAS 133 period does not change the tenor of our results.

As with H2, we conduct three sets of tests to investigate the demand channel. First, we partition the sample by the complexity of the derivatives. We designate firm-years with at least two types of derivatives instruments as a sample of high derivatives complexity and the others as low complexity (Chang et al. 2016). Next, we partition the sample by analyst following and institutional ownership, respectively. If H3 holds, the coefficient on *USER* should be economically larger and statistically more significant in the subsample of firms with more complex derivatives, high analyst following, and high institutional ownership relative to the subsample of firms with less complex derivatives, lower analyst following, and lower institutional ownership.

5. Results

Sample Selection and Descriptive statistics

We collect data from the intersection of the Compustat, CRSP, and I/B/E/S databases. We start with firms that issue MEFs between 1997 and 2012, resulting in 37,286 firm-year observations. We then retain observations with necessary stock market and accounting data available from Compustat, CRSP, and I/B/E/S. The firms in this final sample also meet the following criteria: (1) publicly traded; (2) domestically incorporated; (3) non-financial/non-regulated industry; and (4) non-subsidiary. Finally, we merge this filtered sample with the data on corporate derivatives. Following Manconi, Massa, and Zhang (2017), we collect corporate derivatives information from annual filings using a keyword search through the SeekEdgar database.[13] Although we closely follow their data collection procedure, we significantly expanded their list of keywords. Some of the keywords/phrases we added to our search included "derivatives," "derivative contracts," "derivative instruments," "cash flow hedge

[13] Not all SEC filings by public companies were available on EDGAR. Firms were phased into EDGAR filing over a three-year period, ending May 6, 1996. As of that date, all public domestic companies were required to submit their filings via EDGAR.

accounting," and "designated as a hedge." To identify derivatives users, we restrict our attention to observations with derivatives-related keywords/phrases in their annual reports (10-K, 10-K/A, 10-K405, 10-K405/A, 10-KT405, 10-KT405/A). If an amendment was filed during a period, we use the annual report that had the highest number of derivatives-related keywords. We also distinguish between foreign exchange (FX), interest rate (IR), and commodity price (CP) users. We classify firms as FX/IR/CP users if the filings contained at least three instances of keywords associated with FX/IR/CP derivatives use (Manconi et al. 2017). We further classify a firm as a derivatives user if it was initially classified as an FX/IR/CP user or if it had 20 or more derivatives-related keywords. Our final sample consists of 21,880 firm-year observations with 9,721 *User* and 12,159 *Non-User* firm-year observations. This sample represents 2,123 unique firms, of whom 797 (430) initiated (terminated) a derivatives program and are thus classified as *New Users* (*New Non-Users*).

Table 1 presents the characteristics of the *Users* and *Non-Users* samples. Panel A reports the sample selection criteria detailed above. Panel B presents the temporal distribution of the sample. Consistent with prior studies, we observe an increase in the use of derivatives around 2001, the year SFAS 133 was adopted. Panel C illustrates the industry distribution of *Users* and *Non-Users*. Overall, firms from the business equipment and manufacturing industries comprise the largest proportion. Thus, following prior studies on derivatives and MEFs, we control for industry and year fixed-effects.

Table 2 reports the descriptive statistics. Panels A and B report that the mean (median) MEF is 2.009 (1.000). However, consistent with H1, the frequency of MEFs is significantly higher for *Users* (2.562) than *Non-Users* (1.566). Further, derivatives users have higher analyst following, higher institutional ownership, and are larger than non-users. Studies show that abnormal accruals can be a factor in explaining corporate disclosure policy. However, we do not observe a significant difference in abnormal accruals between *Users* and *Non-Users*. Panel

C of Table 2 reports the *Pearson and Spearman* correlation. A consistently positive pattern can be observed between *USER* and *MEF_FREQ* in both correlations. In addition, we do not observe any flipped sign between the two correlations, indicating a low concern for outliers.

Panel A of Table 3 reports the covariate balance between *New Users* and the *Non-Users* control firms, while Panel B of Table 3 reports the covariate balance between *New Non-Users* and the *Non-Users* control firms. If the covariates are balanced, then the differences in the frequency of managerial earnings forecasts can be attributed to derivatives initiation (termination) rather than other firm characteristics. We report the *p*-values from the tests of the differences in means (*t*-tests), medians (Wilcoxon rank-sum tests), and distributions (Kolmogorov-Smirnov test) of the risk management incentives between *New Users* and *Non-Users* (Panel A) and *New Non-Users* and *Non-Users* (Panel B). Propensity score matching does *not* require matched firms to be identical across all covariates (Caliendo and Kopeinig 2008). Of the 13 variables, only two are statistically dissimilar at the 90% confidence level (*ECSENS* and *ABACC* in Panel A and *ALTZ* and *EV* in Panel B). When all of the covariates are considered together, the Hotelling's T^2 tests (p=0.920 in Panel A and p=0.566 in Panel B) indicate that *New Users* and *New Non-Users* are not different from the control firms. Overall, Table 3 shows that our matching process was successful.

Relation between Derivatives Use and MEFs (H1)

We first test the relation between firms' use of derivatives and the likelihood that managers issue a MEF using the entire sample of derivatives *Users* and *Non-Users* (Eq. [1]), as well as the more focused settings of *New Users* (Eq. [2]) and *New Non-Users* (Eq. [3]). We predict that MEFs will be positively associated with derivatives use and will be higher (lower) after the initiation (termination) of a derivatives program. Table 4 presents the estimates of Eq. [1] and the formal test of H1 using our entire sample of *Users* and *Non-Users*. Consistent with our prediction, we observe a positive association between derivatives use and the frequency of

MEFs. The coefficient on our variable of interest, *USER*, is positive and significant (0.115), with a *p*-value less than 0.01.[14] The frequency of MEFs is also higher for firms that are larger and firms that have higher institutional ownership and lower earnings volatility (Waymire 1985; Ajinkya, Bhojraj, and Sengupta 2005; Baik, Farber, and Lee 2011).

Next, we examine the relation between derivatives use and MEFs in the more focused settings of derivatives initiation and termination and use a difference-in-differences design to alleviate concerns about potential correlated omitted variables. Panels A and B of Table 5 present estimates of Eq. [2] and [3]. The coefficient on *NEWUSER*×*POST* is positive and significant in Panel A and negative and significant in Panel B. We do not have a prediction on the change in control firms' disclosure policies (i.e., the coefficient on *POST*).[15] Nonetheless, the results suggest that relative to control firms, the frequency of MEFs is greater for *New Users* and lower for *New Non-Users* after initiation and termination, respectively. The insignificant coefficients for *New Users* (*New Non-Users*) suggest there is no difference between *New Users* (*New Non-Users*) and the control groups prior to initiation (termination). Overall, the evidence from our tests of H1 suggests that derivatives users issue more MEFs.

To gauge the economic magnitude of the effect of derivatives initiation (termination) on MEFs, we estimate the percentage change in *FREQ* for *New Users* (*New Non-Users*) after initiation (termination) by calculating the marginal effect of *POST* on *FREQ* for *New Users (New Non-Users).* This marginal effect indicates how the *FREQ* of *New Users (New Non-Users)* changes as *POST* changes from 0 to 1, holding other variables constant. The ratio of the marginal effect of *POST* to its pre-initiation (termination) value (i.e., *POST*=0) estimates the

[14] To estimate the economic magnitude, we compare the coefficient of *USER* with that of *INST*. For this comparison, we convert *INST* into a binary variable that equals 1 (0) for high (low) institutional ownership based on the median value of *INST*. In the negative binomial model, we interpret the regression coefficient as the change in the natural log of expected counts of the response variable for a one-unit change in the predictor variable. The (unreported) results indicate that the coefficients on *USER* and *INST* are very similar, which implies that the effects of *USER* on the frequency of MEFs are economically large enough to be comparable with that of *INST*.

[15] Baginski and Hinson (2016) suggest that control firms may decrease their forecasting when their peer firms provide more forecasts because the control firms can free ride on their peers benefitting from the information transfer among them. However, it is also possible that the control firms experience no change in forecasts, thus leading to an insignificant coefficient on *POST*.

relative percentage change in *FREQ* for *New Users* (*New Non-Users*) after initiation (termination). The ratios indicate that relative to *Non-User* control firms, *New Users* (*New Non-Users*) experience a 24.28% increase (21.58% decrease) in the frequency of MEFs (on average) after derivatives initiation (termination). The economic magnitude analysis indicates that our results are both statistically and economically significant.

The "Supply" Channel (H2)

To examine whether our results are driven by the supply or the demand channels, we perform additional tests. H2 tests the supply channel and predicts that the positive association between the use of derivatives and MEFs is driven by a lower cost of supplying forecasts for derivatives users. If the supply channel holds, we expect the frequency of MEFs to be higher for hedge accounting users (H2A), effective hedgers (H2B), and hedge accounting users in the post-SFAS 133 period (H2C) because these derivatives users have lower earnings uncertainty. As noted, we classify *Users* as hedge accounting users and non-hedge accounting users based on the reported amount of accumulated gains/losses for derivatives in the cash flow hedges. We also classify *New Users* as effective or speculator/ineffective hedgers based on the difference between the actual and expected risk exposure after initiation. Finally, SFAS 133 is an indicator variable equal to 1 for firm-year observations after the adoption of SFAS 133. In Panel A of Table 6 we regress *HEDGE_USER* and *NON_HEDGE_USER* on the frequency of MEFs. Among 9,721 *User* observations, 3,294 (6,427) are classified as hedge accounting user (non-hedge accounting user) observations. Consistent with H2A, the coefficient on *HEDGE_USER* (0.190) is positive and significant and a Wald Test of the difference between the coefficients on *HEDGE_USER* and *NONHEDGE_USER* confirms that the coefficient on *HEDGE_USER* is statistically larger than the coefficient on *NONHEDGE_USER*.

Panel B of Table 6 reports the association between the frequency of MEFs and *New Users* that are effective hedgers (*EH*) and speculator/ineffective hedgers (*SPIN*) before and

after initiation relative to a matched control sample. Among 797 *New Users*, 657 (140) firms are classified as *EH* (*SPIN*) firms. The coefficient on *NEWUSER_EH×POST* is positive and significant but the coefficient on the interaction term *NEWUSER_SPIN×POST* is insignificant, suggesting that the frequency of MEFs is higher after initiation only for firms that are effective derivatives users (H2B).

Finally, in Panel C we examine the impact of SFAS 133 on the frequency of MEFs. Although firms used hedge accounting before and after SFAS 133, we expect earnings to be easier to forecast for hedge accounting users in the post SFAS 133 period because (1) more effective hedges qualify for hedge accounting after SFAS 133; (2) more instruments qualify for hedge accounting after SFAS 133; and (3) hedge accounting after SFAS 133 was designed to minimize the earnings volatility for these highly effective hedges. In the first column, we use a sample of firms that use hedge accounting after SFAS 133 and expect a positive association between the adoption of SFAS 133 and the frequency of MEFs for this sample of hedge accounting users. In the second column, we expand the sample to hedge accounting users and non-hedge accounting users and expect the impact of SFAS 133 to be stronger for the hedge accounting users. The results in both columns show a positive association between the adoption of SFAS 133 and the frequency of MEFs, and the coefficient on the interaction term *SFAS133×HEDGE_USER* is positive and significant in the second column (0.292).

These results are consistent with the idea that hedge accounting under SFAS 133 reduces earnings uncertainty by resolving the timing mismatch issues between the derivatives and the hedged items for hedge accounting users. Our results in Panel C have implications for the debate over SFAS 133. Although numerous parties have expressed concerns about the complexity imposed by SFAS 133, our results shed light on the positive effects of SFAS 133 on disclosure. Overall, the results in Table 6 support the supply channel that the use of derivatives reduces the cost of supplying MEFs by reducing the future earnings uncertainty.

The "Demand" Channel (H3)

Next, we test the demand channel and examine whether the frequency of MEFs is higher for derivatives users that may experience higher investor and analyst demand for MEFs due to their use of derivatives (firms with more complex derivatives, higher analyst following, or higher institutional ownership). In Panel A of Table 7 we find that the coefficients on *USER* are not significantly different for firms with low and high derivatives complexity. In Panel B, we find that the coefficients on *USER* are not statistically different between *Users* with low and high analyst following. Similarly, in Panel C, we find that the coefficients on *USER* are not statistically different between firms with high and low institutional ownership. Overall, our results in Table 7 fail to provide support for the demand channel.[16]

Highly complex derivatives can increase managers' perceived risk of forecasting because the managers are not experts in handling derivatives, which thus prevents them from issuing more forecasts even in the presence of investor demand. We acknowledge that the lack of a significant finding in Table 7 does not refute the demand channel argument and may be attributable to other factors, such as omitted variables correlated with our proxies for the demand channel. In untabulated tests, we use the pre-SFAS 161 period as another proxy for the investor demand for disclosure because there are fewer mandatory disclosure requirements for derivatives in pre-SFAS 161 as opposed to the post-SFAS 161 period.[17] If the demand channel exists, we should observe that users issue more MEFs in the pre-SFAS 161 period than post-SFAS 161 period. Consistent with our earlier finding, we do not observe that firms issue more MEFs in pre-SFAS 161 than post-SFAS 161 and fail to support the demand channel.

[16] In Table 7, we use the full interaction model (split-sample analysis), and our results are robust to the partial interaction model. In Panel B of Table 6, we choose a partial interaction model because we need to follow the design of the initiation (termination) of users.

[17] Statements of Financial Accounting Standards No. 161 (SFAS 161), *Disclosures about Derivative Instruments and Hedging Activities*, is an accounting standard issued in March 2008 by the FASB. This standard amended and significantly expanded the disclosure requirements of SFAS No. 133, with the intention of providing users of financial statements with an enhanced understanding of why an entity uses derivatives instruments, and how such instruments and hedge items are accounted for and impact financial statements. SFAS 161 is now codified under ASC 815.

Additional Tests

Forecasts Other than Earnings

In untabulated analyses, we investigate whether the type of underlying asset affects disclosure decisions. We predict that foreign currency hedgers are more likely to issue sales forecasts than interest rate hedgers because hedging foreign currency risk on the revenue side makes forecasting sales easier for managers. However, interest rate hedging should not have a significant impact on sales uncertainty because the gains/losses on interest rate derivatives are commonly included in interest income/expenses. Consistent with the supply channel argument, we find a positive association between foreign exchange hedgers and the frequency of management sales forecasts.

Alternative Attributes for Voluntary Disclosure Quality

In addition to the frequency of MEFs, the use of derivatives could also affect other properties of MEFs such as their timeliness, precision, and accuracy. In untabulated results, we find a positive and significant association between the use of derivatives and precision and accuracy, suggesting that derivatives users are more likely to make forecast point estimates and have higher forecast accuracy. However, we do not find a statistically significant association between the use of derivatives and timeliness. Our findings show that managers do not only increase the frequency of their disclosure but issue more informative disclosures. Overall, the results of these supplemental tests are consistent with the supply channel argument.

Correlated Omitted Variables

New derivatives users typically state in their 10-K that they initiate derivatives programs to eliminate the variability of cash flows in interest payments, to manage the currency risk resulting from purchase and sale commitments denominated in foreign currencies, and/or to mitigate the exposure to volatile commodities (e.g., copper, natural gas). Derivatives initiation can occur simultaneously with a structural change in a firm's risk exposure. For

example, some *New Users* in our sample (approximately 20%) experience an increase in their credit facility or acquire foreign subsidiaries when they begin using derivatives.

To confirm that derivatives initiation, and not structural changes in a firm's risk exposure, influences the frequency of MEFs, we identify three situations in which a firm is likely to experience risk exposure shocks. First, we consider firm-years with an increased debt ratio to have high exposure to interest rate risk, and low otherwise. Specifically, the firms in the top three (bottom two) quintiles of risk exposure shock are designated as a high (low) shock partition. Second, we also consider firms with foreign income or a foreign subsidiary to have high exposure to foreign exchange rate risk, and low otherwise. Finally, we regard firms in the commodity industry (e.g., grain, pork, coal, gold, and gas) to have high exposure to commodity price risk, and low exposure otherwise. After partitioning the sample into high and low risk exposure shocks, we redo the analysis in Panel A of Table 5. For interest rate risk exposure, we find that the effects of initiation on the frequency of MEFs are significant for both the high and low shock partitions, although there is no difference between the partitions (unreported). For foreign risk exposure and commodity price risk exposure, the coefficient for *NEWUSER×POST* is significant only for firms that experience low risk exposure shocks (unreported). Overall, these results suggest that derivatives initiation, rather than risk exposure shocks, increases the frequency of MEFs.

Firm and Manager Fixed Effects

In our primary tests, we use a difference-in-differences research design that includes several control variables and industry and year fixed effects. To further mitigate the likelihood that our results are explained by a time-invariant, correlated omitted variable, in an untabulated analysis, we use firm fixed effects in place of industry fixed effects.

To investigate whether managerial traits drive our results, we include manager fixed effects and find all results are robust. Our SFAS 133 test (Table 6 Panel C) further addresses

the issue from managerial traits. Because SFAS 133 introduces an exogenous shock to firms' earnings volatility, such change in earnings volatility does not result from managers' decisions. Overall, the evidence supports that our results are robust to manager and firm fixed effects.

6. Conclusion

We examine whether and how the corporate use of derivatives influences the frequency of MEFs. Using a hand-collected sample of 21,880 firm-year observations of derivatives users and non-users, we find that derivatives users are likely to issue more earnings forecasts than non-users. Furthermore, we find that the frequency of MEFs increases (decreases) for firms that begin (stop) using derivatives after derivatives initiation (termination) relative to non-users. Cross-sectional tests indicate that the positive association between the use of derivatives and MEFs is stronger for firms that apply hedge accounting and are effective hedgers and is more pronounced in the post-SFAS 133 period, which is consistent with the argument that firms' risk management activities make it easier for managers to forecast earnings. However, we do not find any evidence to support that a higher frequency of MEFs for derivatives users is driven by the information demands resulting from the complexity of derivatives.

A limitation of our study is that a firm's decision to forecast earnings may be correlated with its risk management incentives. Nevertheless, our difference-in-differences tests provide consistent support for our findings after controlling for all known risk management incentives by propensity score matching. Our hand-collected data on derivatives initiation reasons and additional analyses further provide corroborating evidence that our main results are driven by the use of derivatives rather than concurrent risk exposure shocks.

This study focuses on earnings guidance because the use of derivatives heavily affects future earnings, and the market does not understand such impacts (Campbell et al. 2015; Chang et al. 2016). However, the effects of derivatives on firms' disclosure decisions might vary with

their choices of disclosure channels (e.g., social media, conference calls). Future research may wish to examine how and why firm disclosure channels other than MEFs are affected by derivatives use. In addition, because there is no consensus on how to proxy for proprietary costs in the context of derivatives, it may also be interesting for future studies to develop a proprietary cost measure and examine how it interacts with derivatives and disclosure policy.

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Appendix A
Variable definitions

Dependent variables

FREQ	Management earnings forecast frequency, defined as the number of annual earnings forecasts issued by firm *i* in year *t*.

Variables of interest

USER	Indicator variable equal to 1 if the firm reports a position in derivatives in fiscal year *t*; 0 if the firm does not report a position in derivatives.
NEWUSER	Indicator variable equal to 1 for all *New User* firm observations and 0 for all matched control firm observations.
NEWNONUSER	Indicator variable equal to 1 for all *New Non-User* firm observations and 0 for all matched control firm observations.
HEDGE_USER	Indicator variable equal to 1 for *User* observations with non-missing and non-zero unrealized holding gain/loss from derivatives; 0 otherwise.
NONHEDGE_USER	Indicator variable equal to 1 for *User* observations with missing or zero unrealized holding gain/loss from derivatives; 0 otherwise.
EH	Indicator variable equal to 1 if the firm effectively hedges (reduces) its exposure to at least two risks (interest rate (*IRISK*), foreign exchange rate (*FRISK*), or commodity price (*CRISK*) risks) relative to expectations after derivatives initiation; 0 otherwise. See Zhang (2009) for details.
POST	Indicator variable equal to 1 for both *New User (New Non-User)* and matched control firm observations in periods after derivatives initiation (termination); 0 otherwise.

Disclosure determinants

INST	Institutional ownership for firm *i* at end of year *t*.
SIZE	Log of equity market value (prcc_f×csho) at end of year *t*.
FOL	Number of analysts following firm *i* in year *t*.
BIGN	Indicator variable for Big N auditors.
LITIGATION	Indicator variable equal to 1 if the firm belongs to an industry with a high incidence of litigation; 0 otherwise. See Francis, Philbrick, and Schipper (1994) for details.
MB	Market to book ratio, defined as equity market value (prcc_f×csho) divided by book value of equity (at−lt−pstkl+txditc+dcvt) at end of year *t*.
NEGNEWS	Indicator variable for negative earnings news for firm *i* in year *t*.
ExPOST_EVOL	Ex-post earnings volatility, defined as the standard deviation of quarterly earnings before extraordinary items (ibq) during the most recent two years.
ABRETVOL	Abnormal return volatility, defined as the standard deviation of monthly stock returns (adjusted for industry average) for firm *i* at year *t*.
ABACC	Abnormal accruals, based on the performance-matched modified Jones model.

Risk management incentives

IRISK	Interest rate risk exposures, defined as the absolute value of the estimated coefficient from a regression of firms' monthly holding period stock returns on the monthly percentage change in the London Interbank Offered Rate (LIBOR) for 24 months prior to fiscal-year end. See Guay (1999), Zhang (2009), and Donohoe (2015).
FRISK	Foreign currency exchange rate risk exposures, defined as the absolute value of the estimated coefficient from a regression of firms' monthly holding period

	stock returns on the monthly percentage change in the Federal Reserve Board trade-weighted U.S. dollar index for 24 months prior to fiscal-year end. See Guay (1999), Zhang (2009), and Donohoe (2015).
CRISK	Commodity price risk exposures, defined as the absolute value of the estimated coefficient from a regression of firms' monthly holding period stock returns on the monthly percentage change in the Producer Price Index for 24 months prior to fiscal-year end. See Guay (1999), Zhang (2009), and Donohoe (2015).
ALTZ	Likelihood of entering financial distress, defined as the modified Altman-Z score based on parameter weights reported by Shumway (2001).
USCORE	Likelihood of underinvestment, defined by first ranking cash flow from operations (oancf), debt-to-assets ratio (lt/at), and scores from a factor analysis of four growth opportunity measures (prior investment activity, geometric growth in market value of assets, market-to-book ratio, and research and development into deciles by year and industry. Decile ranks for debt-to-asset ratios and growth opportunity factor scores are then added to the reverse decile rank for cash flow from operations, with the result scaled by 30 (total possible points). See Donohoe (2015).
ECSENS	Sensitivity of executive compensation to firm value, defined by first computing the dollar change in value of CEO stock and option holdings that would result from a one percentage point increase in the stock price of the firm (0.01 × prcc_f × [shrown_tot + opt_unex_exer_num]). The result is then normalized by the sum of CEO salary and bonus (salary + bonus) to capture the share of total CEO compensation that would result from a one percentage point increase in firm value. Compensation data obtained from Execucomp. See Bergstresser and Philippon (2006).
CETR	Cash effective tax rate (3-year), defined as the three-year sum (*t* to *t*+2) of worldwide cash taxes paid (txpd) divided by the three-year sum (*t* to *t*+2) of pre-tax book income (pi) less special items (spi). ETRs are reset to 1 (0) if greater (less) than 1 (0). See Dyreng, Hanlon, and Maydew (2008).
CDEBT	Convertible debt, defined as convertible debt (dcvt) divided by lagged total assets (at).
PSTOCK	Preferred stock, defined as preferred stock (pstk) divided by lagged total assets (at).
ExPOST_CVOL	Cash flow volatility, defined as the standard deviation of quarterly operating cash flows (oancfy, adjusted to reflect quarterly data) during the most recent two years.
Other variable	
SFAS133	Indicator variable equal to 1 for observations after fiscal-year June 2000; 0 otherwise.

[a]Compustat mnemonics in parentheses.

Appendix B

In the following two examples, assume that a firm has revenue of $4 and COGS of $2. Revenue is constant over the next few years, the firm sells only one product, and taxes are ignored. In year *t*, the firm hedges its inventory purchase in year *t*+1. After the hedge is in place, the price of inventory goes up by $1 from $2 to $3.

Example 1 (hedge accounting vs. fair value accounting)

This example illustrates how the accounting for derivatives helps managers forecast earnings. In year *t*, the firm has **COGS** of **$2** (purchased at the old price). If the firm uses cash flow hedge accounting, the $1 gain from the change in fair value of the derivatives is recorded in AOCI. In year *t*+1, the firm benefits from the hedge. It purchases inventory at $3 and reclassifies the $1 gain from AOCI to earnings. Thus, **COGS** is **$2** in year *t*+1 again. On the other hand, if a firm uses fair value accounting, the $1 gain on derivatives is recognized in year *t*. Therefore, **COGS** is **$1** in year *t* ($2 purchase of inventory less $1 gain on derivatives). In year *t*+1, the firm purchases inventory at $3. Since the gain on the derivatives was already recognized in year *t*, there is no offsetting effect and **COGS** is **$3**. Compared to fair value accounting, hedge accounting can help managers predict earnings.

Example 2 (effective hedgers vs. speculator/ineffective hedgers)

This example illustrates how the use of derivatives that are effective hedges of the underlying exposure helps managers forecast earnings. As in Example 1, assume that the firm uses cash flow hedge accounting. Further assume that as the price of inventory increases by $1, the fair value of the derivatives increases by only 80 cents (the firm only hedges 80% of its exposure to inventory price changes) and this gain is recorded in AOCI. In year *t*+1, the firm benefits from the hedge. It purchases inventory at $3 and reclassifies the 80 cent gain from AOCI to earnings. Thus, **COGS** is **$2.20** in year *t*+1. If instead the firm hedges 100% of its exposure, as in Example 1, **COGS** is **$2** in years *t* and *t*+1. It is easier for managers to predict earnings when the hedge ratio is higher (100% vs. 80%).

Table 1
Characteristics of *Users and Non-Users*

Panel A: Sample selection

	Obs.
Firms that issue at least one earnings forecast from 1997 to 2012 (2,633 firms)	37,286
Less:	
Observations with missing necessary information to calculate variables	10,710
Observations in financial and regulated industries (SIC 4400-4999 and 6000-6999)	4,620
Observations with missing corporate derivatives information (derivatives users are defined by performing a keyword search through annual reports)	76
Final Sample	21,880

Panel B: Temporal distribution of sample observations

	Users		*Non-Users*	
Year	Obs.	%	Obs.	%
1997	213	2	660	5
1998	398	4	861	7
1999	463	5	920	8
2000	521	5	942	8
2001	652	7	873	7
2002	681	7	844	7
2003	711	7	782	6
2004	689	7	807	7
2005	681	7	798	7
2006	665	7	806	7
2007	666	7	745	6
2008	684	7	694	6
2009	692	7	658	5
2010	691	7	606	5
2011	662	7	594	5
2012	652	7	569	5
Total	9,721		12,159	

Panel C: Industry distribution of sample observations

	Users		*Non-Users*	
Industry group	Obs.	%	Obs.	%
Consumer Non-Durables	938	10	715	6
Consumer Durables	411	4	403	3
Manufacturing	1,699	17	1,160	10
Energy & Extraction	276	3	311	3
Chemicals & Allied Products	531	5	172	1
Business Equipment	1,845	19	3,236	27
Telecommunications	222	2	218	2
Wholesale & Retail	1,551	16	2,016	17
Healthcare	911	9	1,822	15
Constr., Transport. & Services	1,337	14	2,106	17
Total	9,721		12,159	

This table presents characteristics of *Users* and *Non-Users*. Panel A presents the sample selection procedure, Panel B illustrates the temporal distribution of sample observations, and Panel C reports the industry distribution of the sample. *Users* are identified by performing a keyword search in annual fillings.

Table 2
Descriptive statistics

Panel A: Summary statistics

	Mean	Std.dev	Q1	Median	Q3
FREQ	2.009	2.525	0.000	1.000	4.000
INST	0.541	0.350	0.221	0.629	0.841
SIZE	6.693	1.782	5.484	6.595	7.833
FOL	10.139	8.301	4.000	8.000	14.000
BIGN	0.906	0.292	1.000	1.000	1.000
LITIGATION	0.355	0.479	0.000	0.000	1.000
MB	2.650	3.462	1.057	1.853	3.202
NEGNEWS	0.390	0.488	0.000	0.000	1.000
ExPOST_EVOL	0.023	0.050	0.005	0.010	0.023
ABRETVOL	0.125	0.073	0.074	0.107	0.154
ABACC	−0.015	0.138	−0.067	−0.002	0.044

Panel B: Descriptive statistics partitioned by *Users* and *Non-Users*

	(1)		(2)		
	Users		*Non-Users*		
	Mean	Median	Mean	Median	*t*-stat [(1)−(2)]
FREQ	2.562	2.000	1.566	0.000	**28.85**
INST	0.597	0.715	0.497	0.548	**21.34**
SIZE	7.386	7.332	6.140	6.079	**54.42**
FOL	12.051	10.000	8.612	6.000	**30.44**
BIGN	0.944	1.000	0.875	1.000	**17.99**
LITIGATION	0.288	0.000	0.409	0.000	**−18.97**
MB	2.512	1.778	2.760	1.928	**−5.26**
NEGNEWS	0.384	0.000	0.394	0.000	−1.63
ExPOST_EVOL	0.017	0.008	0.029	0.013	**−18.74**
ABRETVOL	0.107	0.092	0.140	0.121	**−34.43**
ABACC	−0.016	−0.005	−0.014	0.000	−0.78
Obs.	9,721		12,159		

Panel C: Pearson (above diagonal) and Spearman (below diagonal) correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	*USER*		**0.196**	**0.143**	**0.348**	**0.206**	**0.116**	**−0.126**	**−0.036**	−0.011	**−0.118**	**−0.222**	−0.005
(2)	*FREQ*	**0.184**		**0.150**	**0.312**	**0.214**	**0.065**	0.006	**0.019**	**−0.045**	**−0.112**	**−0.260**	−0.017
(3)	*INST*	**0.147**	**0.155**		**0.255**	**0.159**	**0.077**	**−0.127**	**0.033**	**−0.028**	**−0.090**	**−0.202**	**−0.029**
(4)	*SIZE*	**0.353**	**0.290**	**0.284**		**0.716**	**0.241**	**0.025**	**0.208**	**−0.150**	**−0.202**	**−0.436**	**−0.037**
(5)	*FOL*	**0.218**	**0.247**	**0.259**	**0.742**		**0.166**	**0.171**	**0.123**	**−0.039**	**−0.057**	**−0.216**	**−0.050**
(6)	*BIGN*	**0.116**	**0.067**	**0.083**	**0.244**	**0.192**		0.013	**0.020**	**−0.020**	**−0.033**	**−0.048**	−0.009
(7)	*LITIGATION*	**−0.126**	0.006	**−0.118**	0.010	**0.130**	0.013		**0.075**	0.004	**0.074**	**0.132**	**−0.021**
(8)	*MB*	**−0.054**	**0.070**	**0.065**	**0.284**	**0.175**	**0.023**	**0.092**		**−0.111**	**0.030**	0.015	**−0.052**
(9)	*NEGNEWS*	−0.011	**−0.028**	**−0.030**	**−0.153**	**−0.045**	**−0.020**	0.004	**−0.181**		**0.073**	**0.081**	**−0.051**
(10)	*ExPOST_EVOL*	**−0.200**	**−0.181**	**−0.171**	**−0.326**	**−0.162**	**−0.085**	**0.165**	−0.005	**0.186**		**0.326**	**−0.082**
(11)	*ABRETVOL*	**−0.247**	**−0.270**	**−0.211**	**−0.500**	**−0.273**	**−0.071**	**0.129**	**−0.103**	**0.101**	**0.442**		**−0.024**
(12)	*ABACC*	−0.012	**−0.030**	**−0.033**	**−0.050**	**−0.054**	−0.016	**−0.020**	**−0.052**	**−0.053**	**−0.057**	**−0.014**	

This table reports descriptive statistics for *Users and Non-Users*. Panel A shows descriptive statistics for the entire sample and Panel B reports summary statistics for *Users* and *Non-Users* along with *t*-statistics for mean tests of differences between those two groups. Panel C presents the Pearson (above diagonal) and Spearman (below diagonal) correlations for the variables in the main analyses. Bold *t*-statistics denote statistical significance at the 1% level (two-tailed).

Table 3
Covariate balance for matched sample

Panel A: *New User* sample

	New Users / Non-Users		
	Mean Diff. *p*-value	Median Diff. *p*-value	Dist. Diff. *p*-value
Risk management incentives			
IRISK	0.918	0.165	0.269
FRISK	0.402	0.586	0.668
CRISK	0.669	0.312	0.243
ALTZ	0.514	0.999	0.964
USCORE	0.809	0.677	0.895
ECSENS	0.425	0.063*	0.019**
CETR	0.616	0.513	0.464
CDEBT	0.194	0.558	0.999
PSTOCK	0.452	0.302	0.997
ABACC	0.811	0.292	0.010**
ExPOST_CVOL	0.983	0.664	0.243
ExPOST_EVOL	0.981	0.973	0.922
SIZE	0.363	0.283	0.100
Hotelling's T^2		0.920	

Panel B: *New Non-User* sample

	New Non-Users / Non-Users		
	Mean Diff. *p*-value	Median Diff. *p*-value	Dist. Diff. *p*-value
Risk management incentives			
IRISK	0.460	0.738	0.684
FRISK	0.304	0.323	0.185
CRISK	0.561	0.584	0.741
ALTZ	0.396	0.033**	0.058*
USCORE	0.705	0.882	0.989
ECSENS	0.342	0.568	0.927
CETR	0.853	0.853	0.741
CDEBT	0.928	0.853	0.795
PSTOCK	0.965	0.746	1.000
ABACC	0.380	0.694	0.684
ExPOST_CVOL	0.764	0.894	0.846
ExPOST_EVOL	0.004***	0.039**	0.136
SIZE	0.523	0.946	0.846
Hotelling's T^2		0.566	

This table presents the covariate balance between the 797 *New Users* (430 *New Non-Users*) and propensity score matched control firms (*Non-Users*) in the match year. Reported values are *p*-values for tests of differences in means (*t*-tests), medians (Wilcoxon rank-sum test), and distributions (Kolmogorov-Smirnov homogeneous distributions test) of risk management incentives. Hotelling's T^2 test is the multivariate equivalent of the two-sample *t*-test and considers whether the vector of all variable means differ between the two groups. *, **, and *** denote statistical significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Variables are defined in Appendix A.

Table 4
Derivatives use and the frequency of management earnings forecasts

	FREQ		
	Coeff.		RSE
USER	0.115	***	0.030
INST	0.206	***	0.049
SIZE	0.148	***	0.014
FOL	0.004		0.003
BIGN	0.052		0.059
LITIGATION	0.053		0.047
MB	−0.007	**	0.004
NEGNEWS	0.022		0.018
ExPOST_EVOL	−1.741	***	0.374
ABRETVOL	−1.581	***	0.233
ABACC	−0.144	**	0.070
Industry FE	Yes		
Year FE	Yes		
R^2	0.06		
Wald χ^2 (model)	3,059.43***		
Observations	21,880		

This table reports tests of whether firms' use of derivatives increases the likelihood that managers provide an earnings forecast, where the dependent variable is *FREQ*. *USER* equals 1 if firm *i* reports a position in derivatives in year *t* (0 otherwise). *, **, and *** denote statistical significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Robust standard errors (RSE) are clustered by firm (Petersen 2009). Variables are defined in Appendix A.

Table 5
Difference-in-differences tests of management earnings forecasts

Panel A: *New User* sample

	FREQ		
	Coeff.		RSE
NEWUSER	−0.089		0.068
POST	−0.164	**	0.066
NEWUSER×POST	0.184	**	0.076
INST	0.228	***	0.062
SIZE	0.168	***	0.018
FOL	0.000		0.003
BIGN	0.090		0.084
LITIGATION	0.076		0.060
MB	−0.011	**	0.005
NEGNEWS	0.029		0.022
ExPOST_EVOL	−1.035	***	0.382
ABRETVOL	−2.227	***	0.313
ABACC	−0.079		0.093
Industry FE	Yes		
Year FE	Yes		
R^2	0.06		
Wald χ^2 (model)	2,009.98***		
Observations	13,591		

Panel B: *New Non-User* sample

	FREQ		
	Coeff.		RSE
NEWNONUSER	0.043		0.066
POST	0.151	*	0.088
NEWNONUSER×POST	−0.230	**	0.100
INST	0.237	***	0.082
SIZE	0.171	***	0.025
FOL	0.005		0.005
BIGN	0.036		0.096
LITIGATION	0.145	*	0.083
MB	−0.002		0.007
NEGNEWS	0.008		0.030
ExPOST_EVOL	−2.286	***	0.674
ABRETVOL	−2.055	***	0.446
ABACC	−0.205	*	0.125
Industry FE	Yes		
Year FE	Yes		
R^2	0.06		
Wald χ^2 (model)	1,100.83***		
Observations	7,278		

This table reports tests of whether derivatives initiation (termination) increases (decreases) the likelihood that managers provide an earnings forecast, where the dependent variable is *FREQ*. *NEWUSER* (*NEWNONUSER*) equals 1 for *New User* (*New Non-User*) firm observations and 0 for matched control firm observations. *POST* equals 1 for periods after derivatives initiation (termination) for *New Users* (*New Non-Users*) and corresponding control firms (0 otherwise). The coefficient on *NEWUSER×POST* (*NEWUSER×POST*) reflects the difference-in-differences estimator of the effects of derivatives initiation (termination) on the frequency of management earnings forecasts. *, **, and *** denote statistical significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Robust standard errors (RSE) are clustered by firm (Petersen 2009). Variables are defined in Appendix A.

Table 6
Test of supply channel

Panel A: Hedge accounting users vs. Non-hedge accounting users

		FREQ		
		Coeff.		RSE
HEDGE_USER	Ψ_1	0.190	***	0.043
NONHEDGE_USER	Ψ_2	0.083	**	0.033
INST		0.210	***	0.049
SIZE		0.144	***	0.014
FOL		0.005	*	0.003
BIGN		0.049		0.059
LITIGATION		0.056		0.047
MB		−0.008	**	0.004
NEGNEWS		0.020		0.018
ExPOST_EVOL		−1.736	***	0.374
ABRETVOL		−1.584	***	0.233
ABACC		−0.146	**	0.070
Industry FE		Yes		
Year FE		Yes		
R^2		0.06		
Wald χ^2 (model)		3,066.97***		
Observations		21,880		
Wald χ^2: $\Psi_1 = \Psi_2$		5.62**		

Panel B: Effective hedgers (*EH*) vs. Speculator/ineffective hedgers (*SPIN*)

	FREQ		
	Coeff.		RSE
NEWUSER_EH	−0.112		0.071
NEWUSER_SPIN	0.044		0.101
POST	−0.165	**	0.066
NEWUSER_EH×POST	0.197	**	0.079
NEWUSER_SPIN×POST	0.130		0.107
INST	0.225	***	0.062
SIZE	0.167	***	0.019
FOL	0.001		0.003
BIGN	0.091		0.084
LITIGATION	0.073		0.059
MB	−0.011	**	0.005
NEGNEWS	0.030		0.022
ExPOST_EVOL	−2.461	***	0.560
ABRETVOL	−2.003	***	0.317
ABACC	−0.105		0.093
Industry FE	Yes		
Year FE	Yes		
R^2	0.06		
Wald χ^2 (model)	2,039.73***		
Observations	13,591		

Panel C: Effect of SFAS 133 on hedge accounting users

	(1)			(2)		
	FREQ			*FREQ*		
	Coeff.		RSE	Coeff.		RSE
SFAS133	1.368	***	0.099	1.111	***	0.085
HEDGE_USER				−0.081		0.127
SFAS133×HEDGE_USER				0.292	**	0.133
INST	0.321	***	0.110	0.216	***	0.064
SIZE	0.088	***	0.029	0.119	***	0.018
FOL	−0.003		0.005	−0.001		0.003
BIGN	0.414	*	0.211	0.138		0.098
LITIGATION	0.143		0.101	0.172	***	0.059
MB	−0.004		0.005	−0.004		0.004
NEGNEWS	0.079	**	0.033	0.027		0.023
ExPOST_EVOL	−4.845	***	1.311	−2.899	***	0.830
ABRETVOL	−2.570	***	0.483	−2.679	***	0.320
ABACC	−0.007		0.177	−0.182	*	0.109
Industry FE	Yes			Yes		
Year FE	No			No		
R^2	0.05			0.04		
Wald χ^2 (model)	515.77***			1,053.94***		
Observations	3,294			9,721		

This table reports tests of whether the association between derivatives use and management forecast activity is stronger when derivatives make earnings easier to forecast (i.e., the supply channel tests). Panel A presents a test of whether hedge accounting users are more likely to issue earnings forecasts than non-hedge accounting users. Panel B reports the results of the difference-in-differences tests on whether effective hedgers are more likely to issue earnings forecasts than speculator/ineffective hedgers after derivatives initiation. Panel C presents tests of how SFAS 133 influences the frequency of earnings forecasts issued by hedge accounting users. Column (1) uses a sample of hedge accounting users only whereas Column (2) uses all derivatives users including non-hedge accounting users (9,721 obs.). *, **, and *** denote statistical significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Robust standard errors (RSE) are clustered by firm (Petersen 2009). Variables are defined in Appendix A.

Table 7
Test of demand channel

Panel A: Demand due to the economic complexity of derivatives

		(1)			(2)		
		FREQ			*FREQ*		
		USER with Low Complexity			*USER* with High Complexity		
		Coeff.		RSE	Coeff.		RSE
USER	Ψ_1	0.076	***	0.029	0.063	**	0.032
INST		0.209	***	0.049	0.211	***	0.049
SIZE		0.159	***	0.013	0.153	***	0.014
FOL		0.004		0.003	0.004		0.003
BIGN		0.060		0.059	0.060		0.059
LITIGATION		0.047		0.047	0.046		0.047
MB		−0.008	**	0.004	−0.008	**	0.004
NEGNEWS		0.027		0.017	0.025		0.018
ExPOST_EVOL		−1.761	***	0.374	−1.785	***	0.378
ABRETVOL		−1.588	***	0.233	−1.624	***	0.233
ABACC		−0.145	**	0.070	−0.146	**	0.070
Industry FE		Yes			Yes		
Year FE		Yes			Yes		
R^2		0.06			0.06		
Wald χ^2 (model)		3,053.00***			3,019.74***		
Observations		21,880			21,880		
Wald χ^2: Ψ_1 (1) = Ψ_1 (2)		0.07					

Panel B: Demand from sell-side analysts

		(1)			(2)		
		FREQ			*FREQ*		
		Low Analyst Following			High Analyst Following		
		Coeff.		RSE	Coeff.		RSE
USER	Ψ_1	0.153	***	0.043	0.077	**	0.036
INST		0.064		0.072	0.165	***	0.060
SIZE		0.123	***	0.021	0.111	***	0.018
FOL		0.072	***	0.010	−0.007	**	0.003
BIGN		0.037		0.072	−0.027		0.083
LITIGATION		0.055		0.060	0.060		0.062
MB		−0.011	**	0.006	−0.004		0.004
NEGNEWS		0.019		0.027	0.013		0.022
ExPOST_EVOL		−2.444	***	0.574	−1.026	**	0.439
ABRETVOL		−1.181	***	0.298	−2.480	***	0.354
ABACC		−0.211	**	0.103	−0.090		0.092
Industry FE		Yes			Yes		
Year FE		Yes			Yes		
R^2		0.06			0.05		
Wald χ^2 (model)		1,567.64***			1,311.75***		
Observations		11,785			10,095		
Wald χ^2: Ψ_1 (1) = Ψ_1 (2)		2.07					

Panel C: Demand from institutional investors

		(1)			(2)		
		FREQ			*FREQ*		
		Low Institutional Ownership			High Institutional Ownership		
		Coeff.		RSE	Coeff.		RSE
USER	Ψ_1	0.095	**	0.044	0.132	***	0.037
INST		0.004		0.102	0.294		0.159
SIZE		0.170	***	0.019	0.115	***	0.019
FOL		0.005		0.004	0.005		0.003
BIGN		−0.035		0.074	0.095		0.083
LITIGATION		−0.005		0.066	0.078		0.057
MB		−0.013	**	0.005	−0.002		0.004
NEGNEWS		0.066	**	0.029	−0.014		0.021
ExPOST_EVOL		−1.279	***	0.389	−2.516	***	0.587
ABRETVOL		−0.901	***	0.295	−2.347	***	0.348
ABACC		−0.137		0.104	−0.163	*	0.094
Industry FE		Yes			Yes		
Year FE		Yes			Yes		
R^2		0.07			0.04		
Wald χ^2 (model)		1,705.74***			1,282.20***		
Observations		10,940			10,940		
Wald χ^2: Ψ_1 (1) = Ψ_1 (2)		0.44					

This table reports tests of whether the association between derivatives use and management forecast activity is stronger when investors demand more information about complex derivatives use (i.e., the demand channel tests). Panel A presents a test of whether users with high derivatives complexity are more likely to issue earnings forecasts than users with low complexity. We designate firm-years with at least two types of derivatives instruments as a sample of high derivatives complexity and that of low complexity otherwise. Panel B (Panel C) reports tests of whether subsamples with high analyst following (high institutional ownership) issue more earnings forecasts than those with low analyst following (low institutional ownership). Subsamples in Panels B and C are created based on the median of analyst following and institutional ownership, respectively. *, **, and *** denote statistical significance levels of 0.10, 0.05, and 0.01, respectively (two-tailed). Robust standard errors (RSE) are clustered by firm (Petersen 2009). Variables are defined in Appendix A.